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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,807	08/24/2000	Volker Weinrich	GR 97 P 1861 D	4185

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EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/645,807

Applicant(s)

WEINRICH ET AL.

Examiner

Shamim Ahmed

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.  
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14, 21 and 22 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-14, 21-22 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/13/05 has been entered.

### ***Response to Arguments***

2. Applicant's arguments filed 6/13/05 have been fully considered but they are not persuasive. Applicants argue that Watabe does not teach or suggest that preventing the breaking through of the electrode by applying a second conductive layer of titanium nitride on a first conductive layer of platinum during over etching of the electrode configuration.

In response to the argument, examiner states that applicant's arguments are more specific than the claims and furthermore, the arguments are not commensurate the claims such as no where it is claimed that preventing the redeposition of platinum by titanium nitride layer.

Furthermore, modified Schele et al with Watabe's process include the similar electrode configuration including the second conductive layer of titanium nitride on a first conductive layer of platinum (see the rejection).

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It is also point out that during over etching, it would have been expected to have the similar result as the instant invention because similar electrode configuration would provide similar effect during over etching unless applicant shows the preventing of the redeposition is performed in a particular manner, which is not taught by the cited prior arts.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-5,7-9,12-14 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606).

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As to claims 1, 21-22, Schuele et al disclose a process of precision etching of platinum electrodes in a stacked capacitor, wherein a second conductive layer (44) of titanium nitride is formed on a first conductive layer (38) of platinum (col. 8, lines 10- 29 and figure 12).

Schuele et al teach that the first conductive layer is unetchable to chemical dry etching because the material for the first conductive layer is similar as the instant application (see lines 18-21 at page 15 of the instant application).

Schuele et al also disclose structuring the second conductive layer by etching to form a structured second layer (col.8, lines 50-52 and figure 13).

Schuele et al further disclose that chemical-physical dry etching such as ion milling or RIE is used to etch the first conductive layer using the structured second conductive layer as a mask (col.5, lines 19-23 and col.8, lines 66-col.9, lines 3).

Schuele et al teach that applying an insulation layer of silicon oxide (30) on the completed electrode configuration and a contact opening is formed and filling the contact opening by depositing tungsten or aluminum to form a contact plug (col.9, lines 36-40).

Schuele et al remain silent about forming at least two contact holes or contact openings with different depths and long over etching is performed due to the different depths of the contact holes.

However, Watabe teaches forming two contact holes (20 and 22) on an insulation layer (41) on an electrode configuration (10), wherein the contact holes having different depths are formed with controlled etching rate for preventing damages

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of a foundation of the semiconductor device (see abstract and paragraphs 0007, 0021, 0032 of the translated version).

Watabe teaches controlling the etch rate depending on the different depths of the contact holes (paragraph 0054) but do not explicitly teach that long over etching is performed due to the different depths of the contact holes.

Watabe teaches the bottom of the contact hole 22 is prevented from being breaking through by controlling the etching rate by changing the size of an opening due to the different depth of the contact holes (see the abstract).

However, it would have been obvious to one of ordinary skill in the art at the time of claimed invention to perform over etching the electrode configuration because the contact hole (24) is deeper than the contact hole (25) to be formed (figure 29).

So, it is expected that one of ordinary skill in the art would be motivated to over etch the substrate in order to form a deeper trench or contact hole as supported by Hwang.

Wherein, Hwang teaches that it is preferable to perform over etching depending on the desired depth of an opening (col.4, lines 7-9).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Watabe's teaching into Schuele et al's process for efficiently connecting conductive layers electrically without damaging the foundation as taught by Watabe.

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As to claims 2-5, and 7, Schuele et al teach that the dry etching for the first layer comprises a plasma etching such oxygen based reactive ion etching (col. 8, lines 66-col.9, lines 3).

As to claim 3, Schuele et al teach that the reactive substance will react with the second conductive material to form non-volatile compound because the material of the second conductive material is exactly the same as the instant application such as titanium nitride.

As to claim 14, Schuele et al teach that the first conductive layer (38) works as a barrier or etch stop layer during the chemical dry etching of the second layer (44) (col. 8, lines 50-58 and see figures 12-13).

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606) as applied to claims 1-5,7-9, 12-14 and 21-22 above, and further in view of Chung (5,976,394).

Modified Schuele et al discussed above in paragraph 5 but remain silent about the dry etching of the first conductive layer comprises an inert gas.

However, Chung teaches that it is conventional to use a reactive gas such as an inert gas (argon) for efficiently etching platinum (col.1, lines 27-40).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Chung's teaching into modified Schuele et al's method for efficiently etching the first conductive layer, which is substantially difficult or substantially

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unetchable by chemical dry etching without making a reaction product through reaction with platinum as taught by Chung..

7. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuele et al (5,930,639) in view of Watabe (JP-5-315457) and Hwang (5,621,606) as applied to claims 1-5,7-9, 12-14 and 21-22 above, and further in view of Yang et al (5,436,190).

Modified Schuele et al discussed above in paragraph 5 but remain silent about the deposition process of silicon oxide, which can be done by TEOS or by a silane process.

However, in a method of fabricating a semiconductor device, Yang et al teach that deposition of silicon oxide is performed by using a TEOS process or by a silane process (col.4, lines 54-67).

Therefore, it would have been obvious to one skill in the art at the time of claimed invention to combine Yang et al's teaching into modified Schuele et al's process for efficient and easy deposition of silicon oxide as taught by Yang et al.

### ***Conclusion***

8. It is noted that in claim 1, line 15-16, and the deleted portion "the contact holes have substantial same diameters" is not shown by strike-through. This portion was deleted in the after-final response filed on 4/28/05, which was not entered. It is requested to show the amended portion accordingly.



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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Shamim Ahmed  
Primary Examiner  
Art Unit 1765

SA  
August 17, 2005